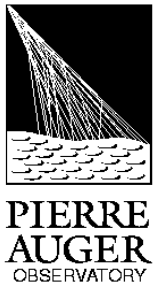
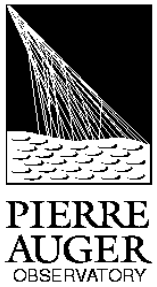


Pierre Auger Project Overview

- Objectives
- Timeline
- Collaboration
- Organization
- Observatory Design
- Status and Plans



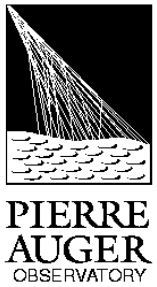
Objectives

A high statistics study of cosmic rays above 10^{19} eV measuring -

- **Energy Spectrum**
- **Direction**
- **Composition**

Using large air shower arrays in:

- **Mendoza, Argentina *(construction underway)***
- **Millard Co, Utah, USA**



Auger Project Timeline

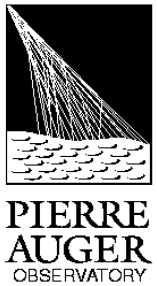
February-July 1995	Study Group – Fermilab (Design Report)
October 12-13, 1998	Founding of the Auger Collaboration Paris
March 16, 1999	Signing of the International Agreement - Mendoza City, Argentina
March 18, 1999	Ground breaking – Malargue, Argentina
January 2000	Beginning of construction
February 21, 2000	Deployment of the first detector

Auger Ground Breaking - Malargue Argentina
March 18, 1999

Dr. M. Abbate, General Manager CNEA; Dr. A. Etchegoyen, Southern Observatory Spokesperson; Acc. V. Russo, Mayor of San Rafael; Prof. J. Cronin, Project Spokesperson; Eng. J. Rodriguez, Minister and Head of National Minister Cabinet; Dr. A. Lafalla, Governor of Mendoza; Acc. C. Jaque, Mayor of Malargüe.

PIERRE AUGER OBSERVATORY

First Engineering Array Surface Detector
February 21, 2000



The Auger Collaboration

50 Institutions, >250 Scientists

Argentina
Armenia*
Australia
Bolivia*
Brazil
Peoples Republic of China
Czech Republic
France
Germany
Greece
Italy
Mexico
Poland
Russia
Slovenia
United Kingdom
USA
Vietnam*

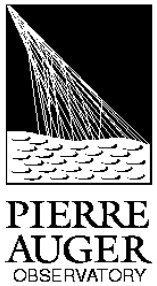
* associate

International Agreement

Initial signing March 16, 1999

Defines a framework for the organization, management and funding required for the construction, commissioning and operation of the Pierre Auger Observatory

The Parties to the Agreement are the funding agencies or their designates.

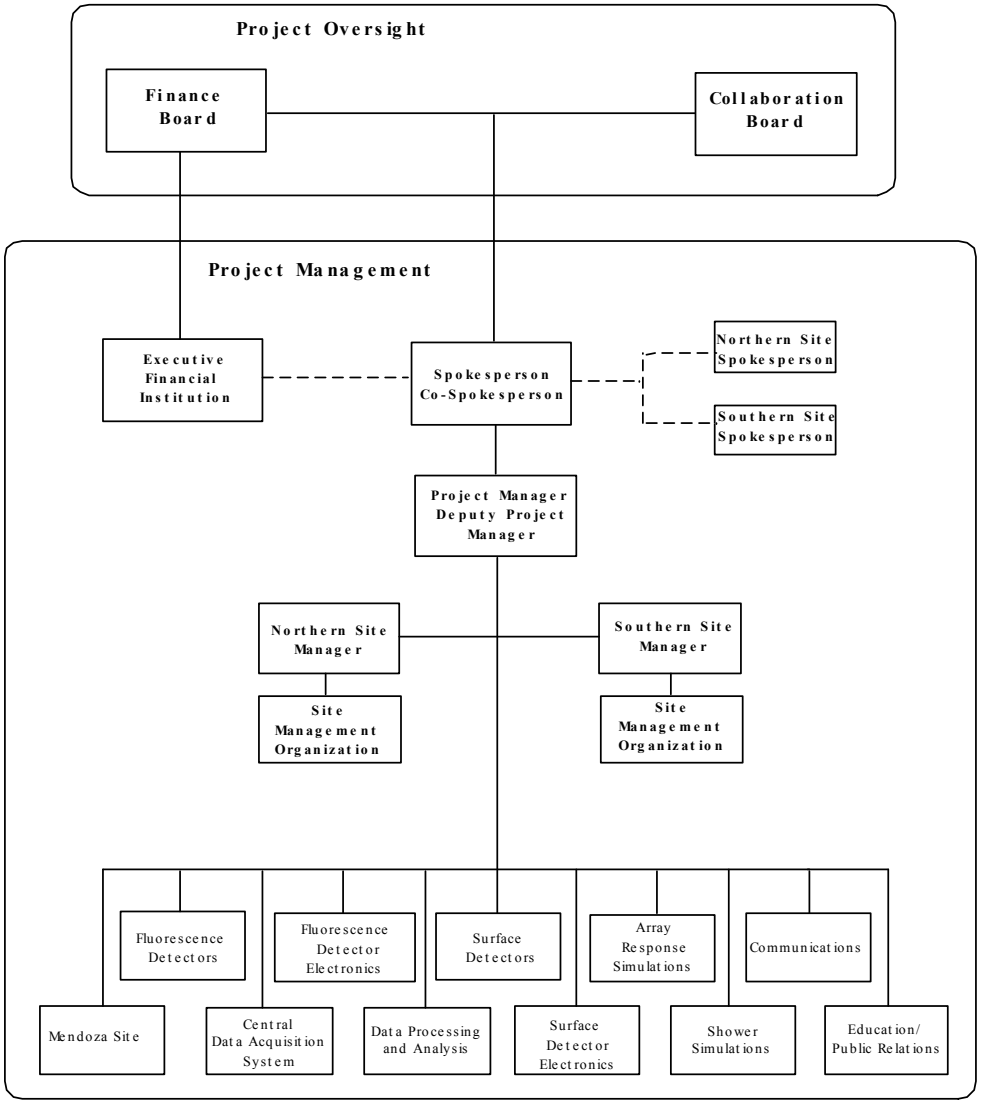


International Agreement

Content

- Commitment
- Organization
- Project Management
- Funding
- Reporting
- Milestones and Schedule
- Data Rights
- Intellectual Property
- Access
- Liability
- Taxes and Customs
- Withdrawal
- Disputes

Global Organization



PIERRE AUGER OBSERVATORY

Collaboration Board

Principal Governing Body of the Collaboration

(One representative per institution)

Role:

- Governance
- Scientific Policy
- Membership
- Monitor construction and operation

Finance Board

Governing Body for Finances

(Representatives of Auger Project Funding Agencies)

Role:

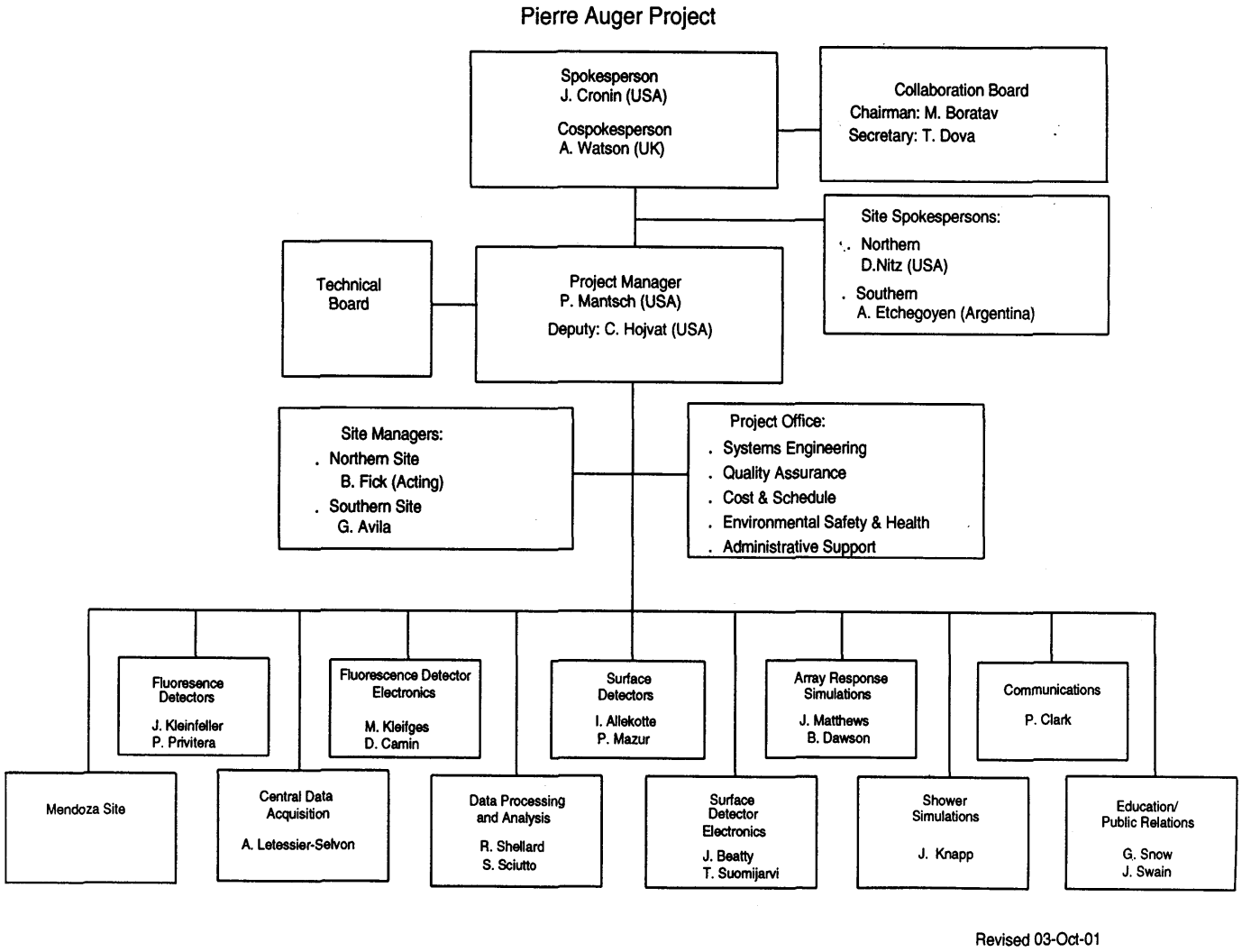
Provide international funding oversight

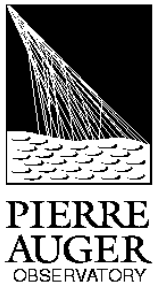
Approve budgets

Monitor project costs and schedule

PIERRE AUGER OBSERVATORY

Management Organization





The Auger Observatory
A Hybrid Detector

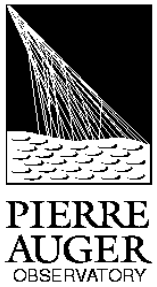
Surface Array

1600 Water Cerenkov Detectors

over 3000 km^2

Fluorescence Detectors

30 telescopes in four enclosures overlooking the surface array



The Auger Observatory

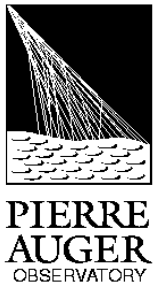
Features of the two techniques

Surface Array

- 100% duty cycle
- Uniform aperture
- Simple robust detectors

Fluorescence Detector

- Calorimetric energy measurement
- Direct measurement of shower development



The Auger Observatory

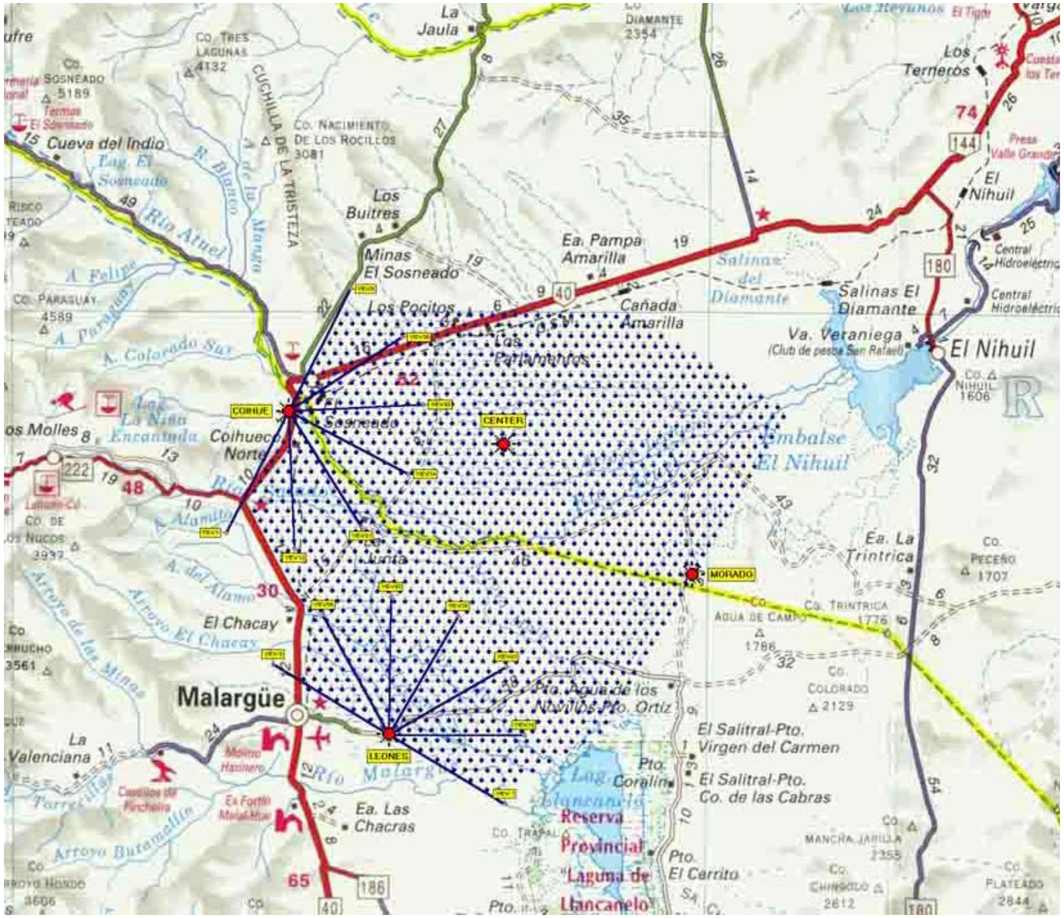
Combines strengths of

Surface Detector Array
and
Fluorescence Detectors

- Independent measurement techniques allow control of systematics
- More reliable energy and angle measurement
- Primary mass measured in complementary ways

PIERRE
AUGER
OBSERVATORY

The Auger Observatory Site



Auger FB review, Malargüe, October 2001.
Overview – *P. Mantsch*

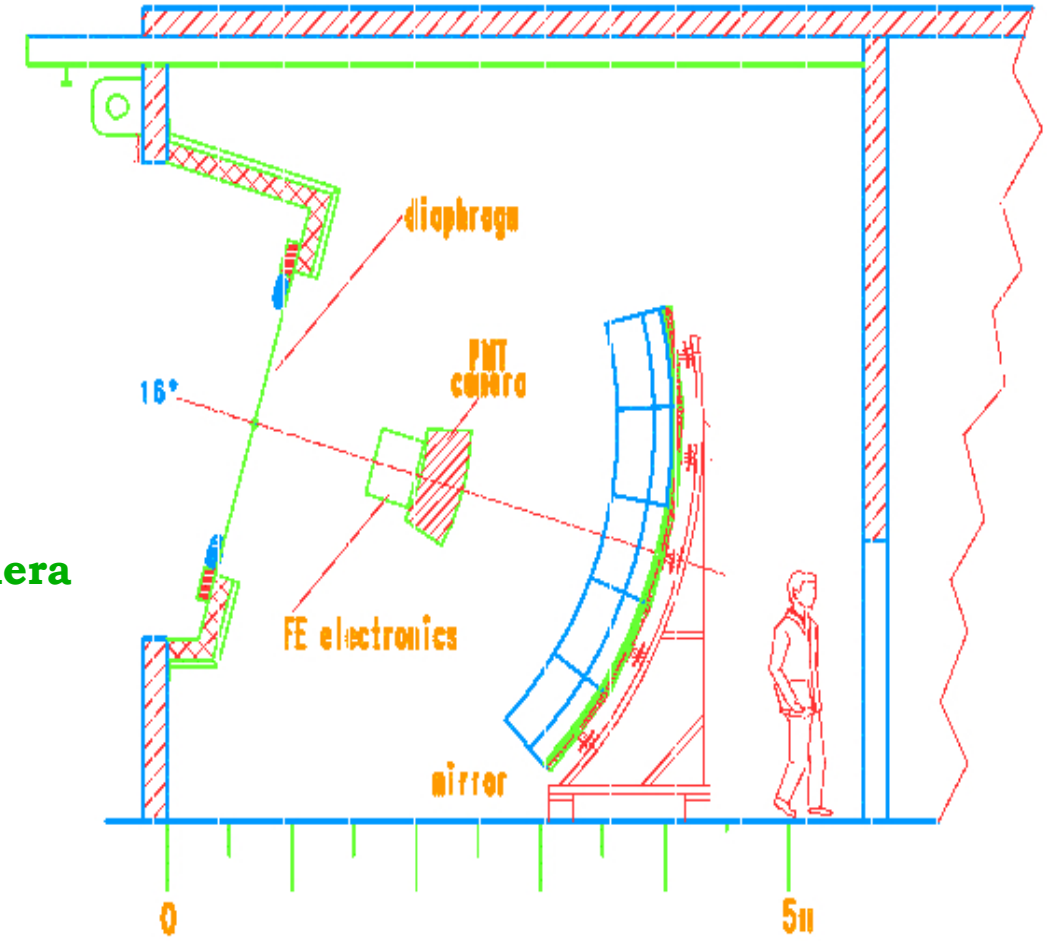
PIERRE AUGER OBSERVATORY

Typical Surface Detector Station with local residents of the Pampa

PIERRE AUGER OBSERVATORY

Auger Fluorescence Detector Telescope

30 telescopes
3.4 meter mirror
440 PMTs per camera



PIERRE AUGER OBSERVATORY

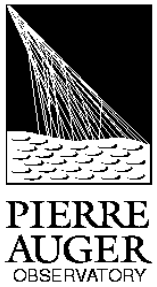
Construction Plan

Years 2000 & 2001 (Engineering Array)

- Install ~40 surface detector station array.
- Install two fluorescence telescopes.
- Install communications and data acquisition.
- Complete Auger Campus.

Year 2002 - 2004

- Full production and deployment
- Transition to data taking



Accomplishments

- **January 2000** — **Engineering Array started**
- **February 21, 2000** — **First EA tank deployed**
- **May 23, 2001** — **First Fluorescence events**
- **August 2, 2001** — **First array shower recorded**

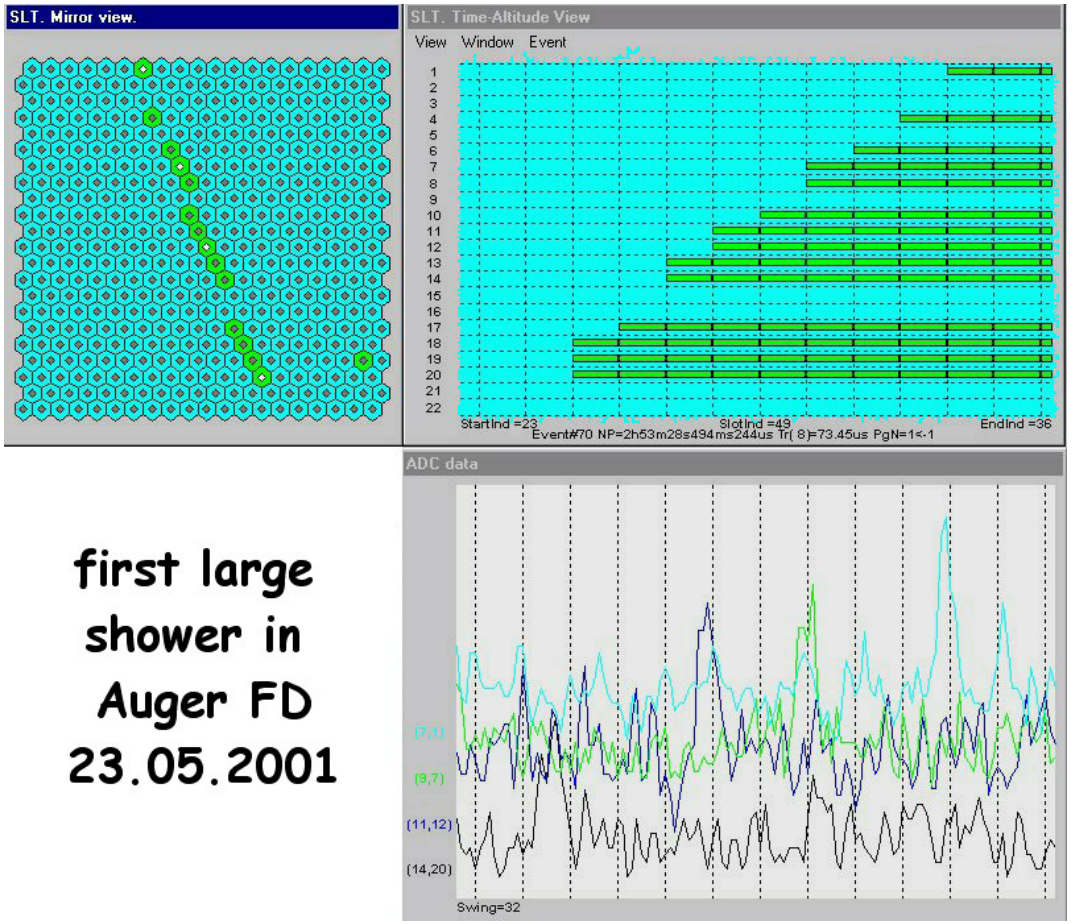
PIERRE AUGER OBSERVATORY

Status and Plans

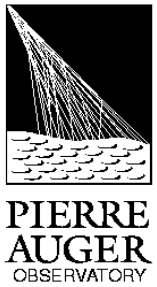
- The Engineering Array is nearly finished
- Construction of the full observatory will begin in 2002

PIERRE AUGER OBSERVATORY

Fluorescence Detector – First Light



first large shower in Auger FD 23.05.2001



Expected numbers of events

Based on AGASA data

For one year at one 3000km^2 site
Zenith angle < 60 deg

	Surface Array (only)	Hybrid (SD + one or more FD)
> 6x10^17 eV	0	approx 45000
> 10^18 eV	0	30000
> 3x10^18 eV	15000	4700
> 10^19 eV	5150	515
> 2x10^19 eV	1590	159
> 5x10^19 eV	490	49
> 10^20 eV	103	10
> 2x10^20 eV	32	3
> 5x10^20 eV	10	1

FD rates assume a coincidence of 2 tanks with 4 VEM and 10% duty cycle
SD rates assume a coincidence of 5 tanks with 4 VEM each.